SSR809N
SSR809P/SSR810P

Technical Data **3-Pin Microprocessor Reset Circuits**
Data Sheet N1589 Rev. -

Description:

SSR809P/SSR810P are low-power microprocessor (µP) supervisory circuits used to monitor power supplies in µP and digital systems. They provide applications with benefits of circuit reliability and low cost by eliminating external components.
These devices perform as valid signals in applications with Vcc ranging from 6.0V down to 0.9V. The reset signal lasts for a minimum period of 140ms whenever VCC supply voltage falls below preset threshold. Both SSR809P and SSR810P were designed with a reset comparator to help identify invalid signals, which last less than 140ms. The only difference between them is that they have an active-low $\overline{\text{RESET}}$ output and active-high RESET output, respectively.
Low supply current (1µA) makes SSR809P/SSR810P ideal for portable equipment. The devices are available in SOT-23 package.

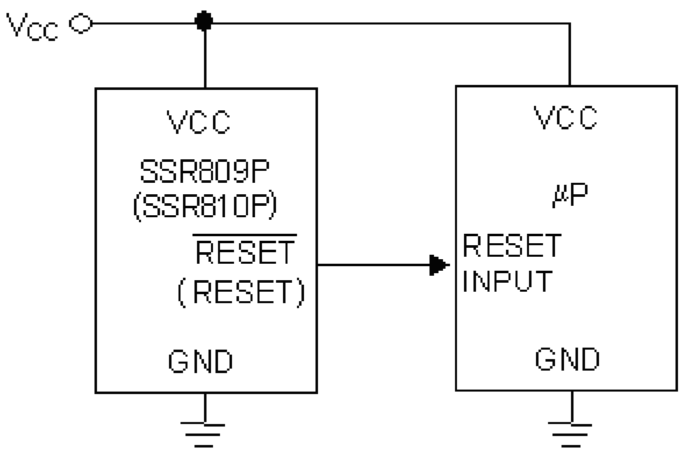
Features:

- **Ultra Low Supply Current 1µA(typ.)**
- **Guaranteed Reset Valid to Vcc=0.9V**
- **Available in Three Output Type: Open-Drain Active Low (SSR809N), Push-Pull Active Low (SSR809P), Push-Pull Active High (SSR810P)**
- **140ms Min. Power-On Reset Pulse Width**
- **Internally Fixed Threshold 2.3V, 2.6V, 2.9V, 3.1V, 4.0V, 4.2V, 4.4V, 4.6V**
- **Tight Voltage Threshold Tolerance: 1.5%**
- **Tiny Package in SOT-23**

Applications:

- **Notebook Computers**
- **Digital Still Cameras**
- **PDAs**
- **Critical Microprocessor Monitoring**

Typical application circuit:



Push-Pull Output

SSR809N
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Ordering Information:

SSR809X -XXXXX
SSR810X -XXXXX

PACKING TYPE
TB: TUBE
TR: TAPING & REEL

PACKAGING TYPE
F: SOT-23

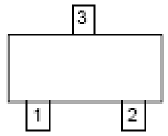
RESET THRESHOLD VOLTAGE
- 23: 2.3V
- 26: 2.6V
- 29: 2.9V
- 31: 3.1V
- 40: 4.0V
- 42: 4.2V
- 44: 4.4V
- 46: 4.6V

OUTPUT TYPE
P: Push-Pull type
N: N-ch Open-Drain type

PIN CONFIGURATION

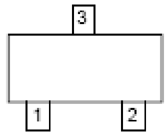
SOT-23

TOP VIEW
1: GND
2: $\overline{RESET}$ (RESET)
3: VCC



SOT-23

TOP VIEW
1: $\overline{RESET}$ (RESET)
2: GND
3: VCC



Marking Diagram:

Part No.	Marking	Part No.	Marking	Part No.	Marking
SSR809P-23FTR	RA23G	SSR810P-23FTR	RD23G	SSR809N-23FTR	RB23G
SSR809P-26FTR	RA26G	SSR810P-26FTR	RD26G	SSR809N-26FTR	RB26G
SSR809P-29FTR	RA29G	SSR810P-29FTR	RD29G	SSR809N-29FTR	RB29G
SSR809P-31FTR	RA31G	SSR810P-31FTR	RD31G	SSR809N-31FTR	RB31G
SSR809P-40FTR	RA40G	SSR810P-40FTR	RD40G	SSR809N-40FTR	RB40G
SSR809P-44FTR	RA44G	SSR810P-44FTR	RD44G	SSR809N-44FTR	RB44G
SSR809P-46FTR	RA46G	SSR810P-46FTR	RD46G	SSR809N-46FTR	RB46G

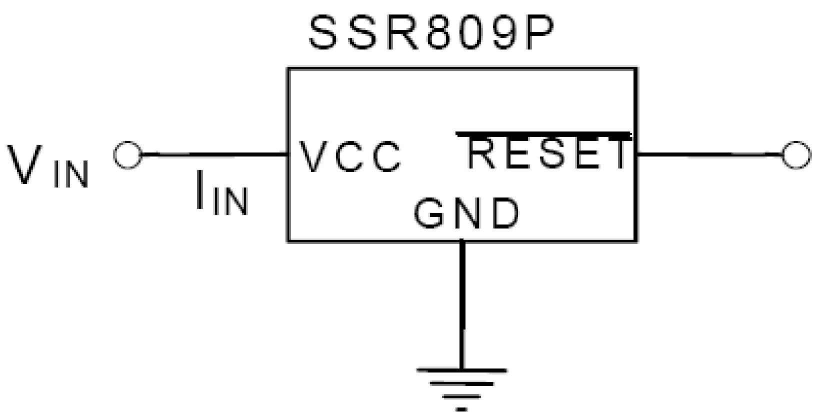
3-Pin Microprocessor Reset Circuits

Absolute Maximum Ratings:

- VCC ………………………………………………………………………………………………-0.3V~6.5V
- RESET, $\overline{RESET}$……………………………………………………………………-0.3V ~ (VCC+0.3V)
- Input Current (VCC)………………………………………………………………………… 20mA
- Output Current (RESET or $\overline{RESET}$)……………………………………………………20mA
- Continuous Power Dissipation (T_A = +70°C) ……………………………………………… 320mW
- Operating Junction Temperature Range ……………………………………………… –40°C to 85°C
- Junction Temperature ……………………………………………………………………………125°C
- Storage Temperature Range ………………………………………………………………–65°C ~ 150°C
- Lead Temperature (Soldering) 10 sec. ……………………………………………………………260°C

Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

Test Circuit



3-Pin Microprocessor Reset Circuits

Electrical Characteristics (Typical values are at T_A=25°C, unless otherwise specified.) (Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Operating Voltage Range	V_{CC}			0.9		6	V
Supply Current	I_{CC}	$V_{CC} = V_{TH}$ +0.1V			1	3	μA
Reset Threshold	V_{TH}	SSR809P-23	T_A=+25°C	2.265	2.3	2.335	V
			T_A= -40°C to +85°C	2.254		2.346	
		SSR809P-26	T_A=+25°C	2.561	2.6	2.639	
			T_A= -40°C to +85°C	2.548		2.652	
		SSR809P-29	T_A=+25°C	2.857	2.9	2.944	
			T_A= -40°C to +85°C	2.842		2.958	
		SSR809P-31	T_A=+25°C	3.054	3.1	3.147	
			T_A= -40°C to +85°C	3.038		3.162	
		SSR809P-40	T_A=+25°C	3.940	4.0	4.060	
			T_A= -40°C to +85°C	3.920		4.080	
		SSR809P-42	T_A=+25°C	4.137	4.2	4.263	
			T_A= -40°C to +85°C	4.116		4.284	
		SSR809P-44	T_A=+25°C	4.334	4.4	4.466	
			T_A= -40°C to +85°C	4.312		4.488	
		SSR809P-46	T_A=+25°C	4.531	4.6	4.669	
			T_A=-40°C to +85°C	4.508		4.692	
V_{CC} to Reset Delay	T_{RD}	$V_{CC}=V_{TH}$ to (V_{TH} -0.1V), V_{TH}=3.1V			20		μS
Reset Active Timeout Period	T_{RP}	$V_{CC} = V_{TH\,(MAX)}$	T_A=+25°C	140	230	560	mS
			T_A= -40°C to +85°C	100		1030	
$\overline{RESET}$ Output Voltage	V_{OH}	$V_{CC}=V_{TH}$+0.1V, I_{SOURCE}=1mA		0.8V_{CC}			V
	V_{OL}	$V_{CC}=V_{TH}$ - 0.1V, I_{SINK}=1mA				0.2Vcc	
RESET Output Voltage	V_{OH}	$V_{CC}=V_{TH}$-0.1V, I_{SOURCE}=1mA		0.8V_{CC}			V
	V_{OL}	$V_{CC}=V_{TH}$+0.1V, I_{SINK}=1mA				0.2Vcc	

Note: 1. Specifications are production tested at T_A=25°C. Specifications over the -40°C to 85°C operating temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).

2. $\overline{RESET}$ output is for SSR809P; RESET output is for SSR810P.

Typical Performance Characteristics

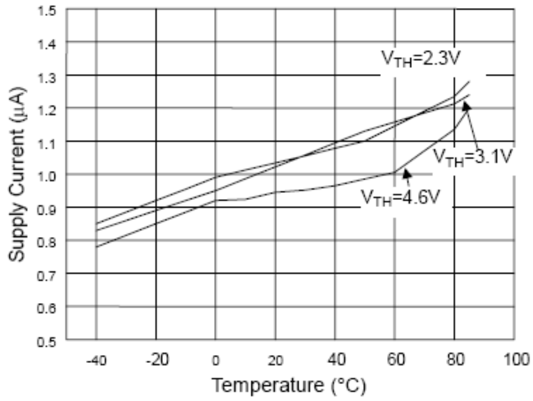


Fig 1 Supply Current vs. Temperature

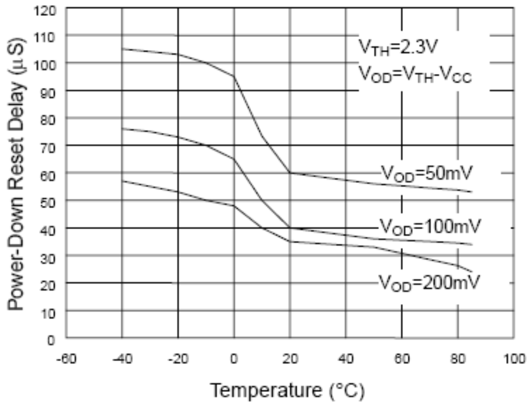


Fig 2 Power-Down Reset Delay vs. Temperature

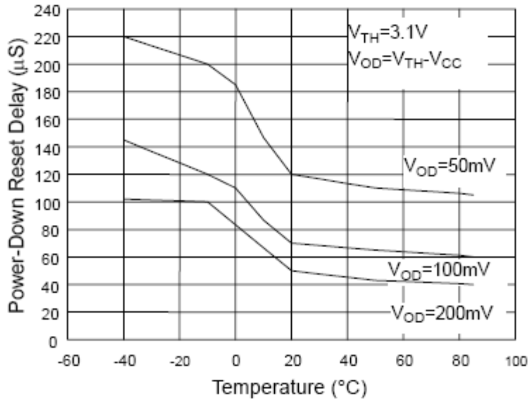


Fig 3 Power-Down Reset Delay vs. Temperature

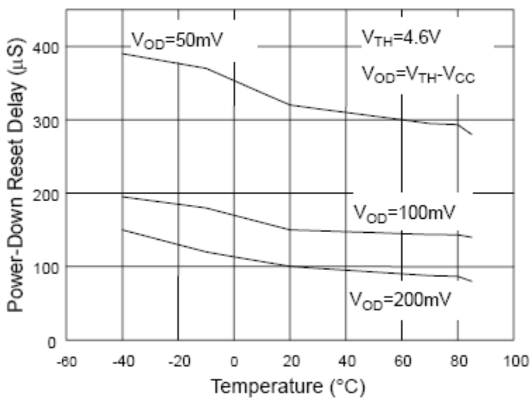


Fig 4 Power-Down Reset Delay vs. Temperature

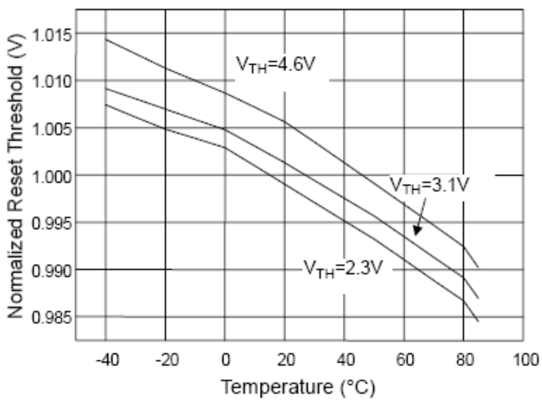


Fig 5 Normalized Reset Threshold vs. Temperature

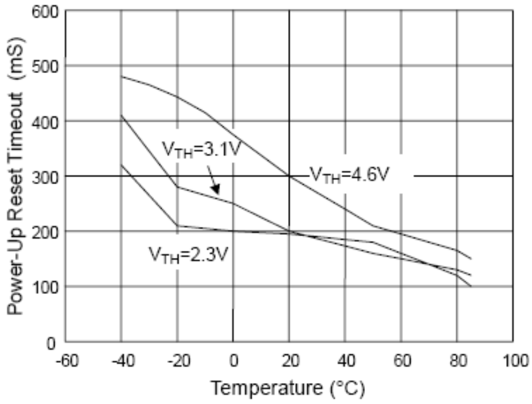
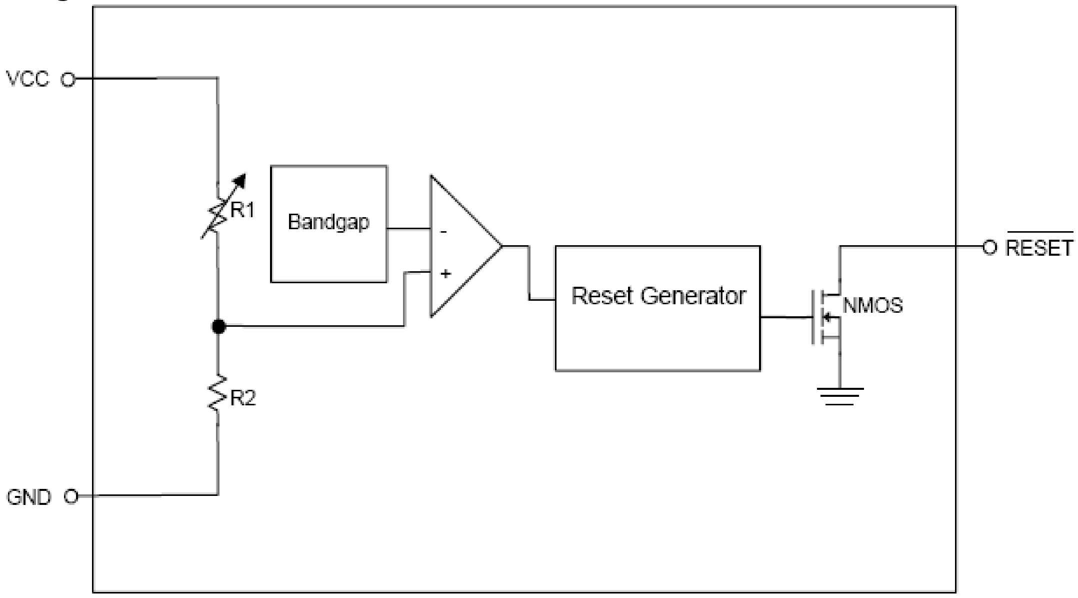
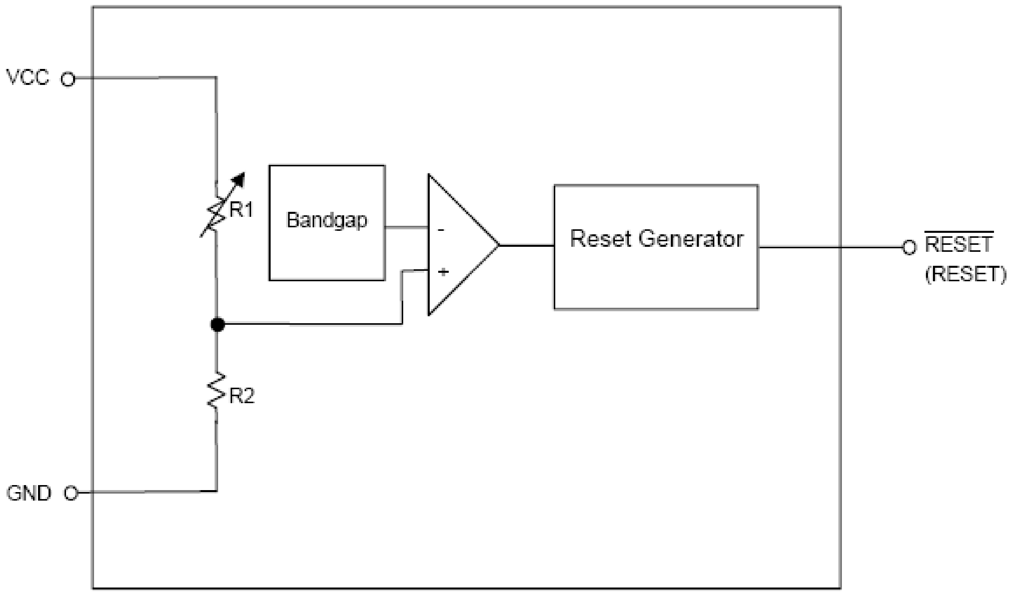


Fig 6 Power-Up Reset Timeout vs. Temperature

Block Diagram



N-ch Open-Drain Type



Push-Pull Type

Pin Descriptions

GND Pin : Ground.
$\overline{\text{RESET}}$ Pin (SSR809P) : Active low output pin. $\overline{\text{RESET}}$ Output remains low while Vcc is below the reset threshold.
RESET Pin (SSR810P) : Active high output pin. RESET output remains high while Vcc is below the reset threshold.
Vcc Pin : Supply voltage.

Detail Descriptions of Technical Terms

RESET OUTPUT
μP will be activated at a valid reset state. These μP supervisory circuits assert reset to prevent code execution errors during power-up, power-down, or brownout conditions.
$\overline{\text{RESET}}$ is guaranteed to be a logic low for V_{TH}>VCC>0.9V. Once VCC exceeds the reset threshold, an internal timer keeps $\overline{\text{RESET}}$ low for the reset timeout period; after this interval, $\overline{\text{RESET}}$ goes high.
If a brownout condition occurs (VCC drops below the reset threshold), $\overline{\text{RESET}}$ goes low. Any time VCC goes below the reset threshold, the internal timer resets to zero, and $\overline{\text{RESET}}$ goes low. The internal timer is activated after VCC returns above the reset threshold, and $\overline{\text{RESET}}$ remains low for the reset timeout period.

BENEFITS OF HIGHLY ACCURATE RESET THRESHOLD
SSR809P/SSR810P with specified voltage as 5V±10% or 3V±10% are ideal for systems using a 5V±5% or 3V±5% power supply. The reset is guaranteed to assert after the power supply falls out of regulation, but before power drops below the minimum specified operating voltage range of the system ICs. The pre-trimmed thresholds are reducing the range over which an undesirable reset may occur.

Application Information

NEGATIVE-GOING VCC TRANSIENTS

In addition to issuing a reset to the μP during power-up, power-down, and brownout conditions, SSR809P series are relatively resistant to short-duration negative-going VCC transient.

ENSURING A VALID RESET OUTPUT DOWN TO VCC=0

When VCC falls below 0.9V, SSR809P $\overline{RESET}$ output no longer sinks current; it becomes an open circuit. In this case, high-impedance CMOS logic inputs connecting to $\overline{RESET}$ can drift to undetermined voltages. Therefore, SSR809P/SSR810P with CMOS is perfect for most applications of VCC below 0.9V. However in applications where $\overline{RESET}$ must be valid down to 0V, adding pull-down resistor to $\overline{RESET}$ causes any leakage currents to flow to ground, holding $\overline{RESET}$ low.

INTERFACING TO μP WITH BIDIRECTIONAL RESET PINS

The RESET output on the SSR809N is open drain, this device interfaces easily with μPs that have bidirectional reset pins. Connecting the μP supervisor's $\overline{RESET}$ output directly to the microcontroller's $\overline{RESET}$ pin with a single pull-resistor allows either device to assert reset.

Application Circuit

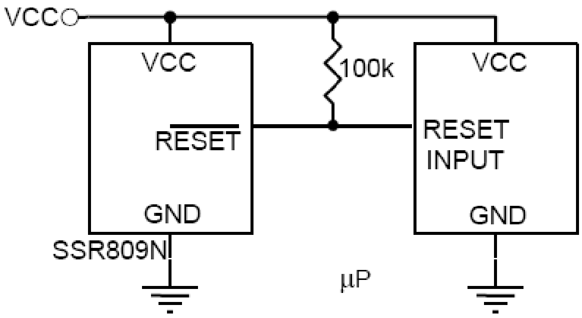


Fig. 7 Open-Drain Output

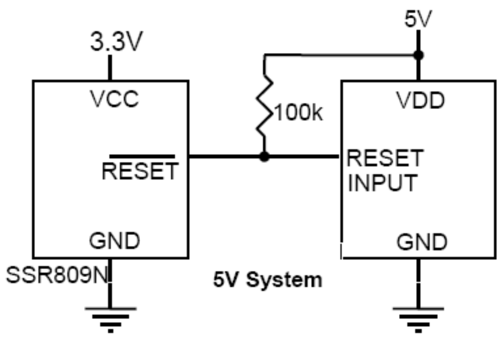


Fig. 8 Open-Drain Output Allows Use with Multiple Supplies

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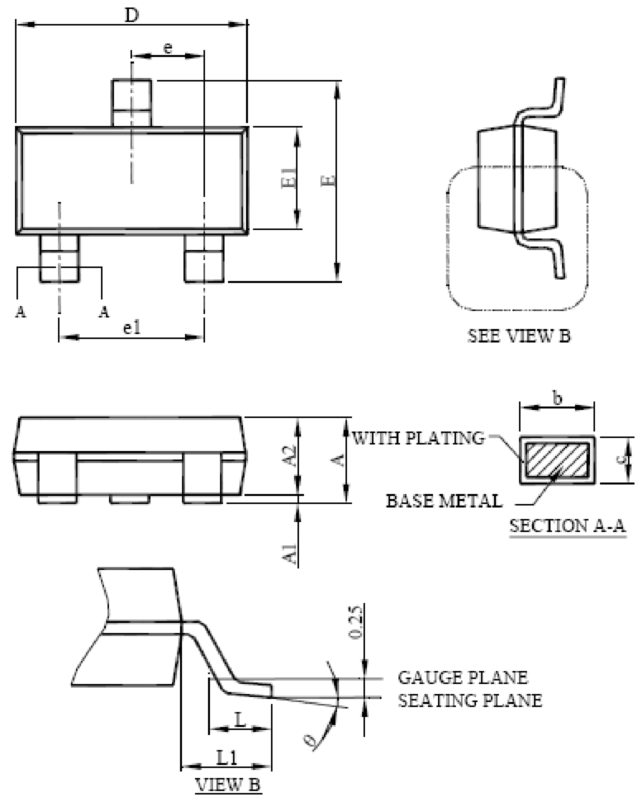
Physical Dimensions

SOT-23 (unit: mm)



SYMBOL	SOT-23	
	MILLIMETERS	
	MIN.	MAX.
A	0.95	1.45
A1	0.05	0.15
A2	0.90	1.30
b	0.30	0.50
c	0.08	0.22
D	2.80	3.00
E	2.60	3.00
E1	1.50	1.70
e	0.95 BSC	
e1	1.90 BSC	
L	0.30	0.60
L1	0.60 REF	
θ	0°	8°

Note: 1. Refer to JEDEC MO-178.
2. Dimension D and E1 do not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 10 mil per side.
3. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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